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| EXAMINER |
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DICKEY, THOMAS L

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| ART UNIT | PAPER NUMBER |
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2826

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05/09/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/733,089

Applicant(s)

NICKEL ET AL.

Examiner

Thomas L. Dickey

Art Unit

2826

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 February 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) 11, 12 and 14-29 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 and 13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 December 2003 and 05 May 2007 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Art Unit: 2826

DETAILED ACTION

Drawings

1. The proposed drawing correction and substitute sheet of drawings, filed on 02/20/2007, have been approved.

Specification

2. A new title, "USING SENSE LINES TO THERMALLY CONTROL THE STATE OF AN MRAM" has been entered.

Claim Rejections - 35 USC § 102

3. Claims 1-10 and 13 are rejected under 35 U.S.C. 102(e) as being anticipated by DAUGHTON ET AL. (2004/0125673).

Daughton et al. discloses a magnetic random access memory device with a plurality of magnetic memory elements 10 comprising a spin dependent tunnel junction (note figures 15A-B and paragraph 0101) or a giant magnetoresistive device (note figures 16A-B and paragraph 0107); at least one write conductor 22 and a free layer 15 or 16, wherein switching a magnetic orientation of at least one of the plurality of magnetic memory elements 10 comprises switching a magnetic orientation of the free layer 15 or 16; a sense line 20' comprising a semiconductor material comprising Si, coupled to the

Art Unit: 2826

plurality of magnetic memory elements 10 in order to sense a magnetic orientation of at least one of the plurality of magnetic memory elements 10; wherein the sense line 20' includes first and second vias (no part #s, each of the vias, one via for each one of the plurality of magnetic memory elements 10, is described in paragraph 0082 as a "further conduction via into the substrate to the other side that transistor along the main current flow path therethrough from an adjacent interconnection 20 in contact with that cell."

Note, paragraph 0079, that sense line interconnections 20 form strings so that each such string forms sense line 20'); and wherein the sense line 20' is utilized to thermally assist (note paragraph 0082) in switching a magnetic orientation of at least one of the plurality of magnetic memory elements 10; further comprising a current source (note paragraph 0095) coupled to the sense line 20' wherein utilizing the sense line 20' to thermally assist in switching a magnetic orientation of at least one of the plurality of magnetic memory elements 10 further comprises utilizing the current source to provide a current from the first to the second via wherein the current heats at least one of the plurality of magnetic memory elements 10; wherein the at least one write conductor 22 comprises only one write conductor 22, positioned orthogonal to the sense line 20' and utilized to switch (note paragraph 0095) the magnetic orientation at least one of the plurality of magnetic memory elements 10. Furthermore, with regard to claim 9

Daughton et al. further discloses two write conductors 22 (one associated with a first of the plurality of magnetic memory elements 10 and the second associated with a second

Art Unit: 2826

of the plurality of magnetic memory elements 10) wherein the two write conductors 22 are utilized to switch the magnetic orientation of at least one (in fact, two) of the plurality of magnetic memory elements 10. Note figures 11A, 15A-B, 16A-B, 20, 21,22, and paragraphs 0078-0084,0087-0095, and 0101-0107 of Daughton et al.

Response to Arguments

4. Applicant's arguments filed 02/20/2007 have been fully considered but they are not persuasive.

Applicant claims a magnetic random access memory device comprising:

- a plurality of magnetic memory elements;
- a sense line;
- a first via and
- a second via;

wherein the sense line is coupled to the plurality of magnetic memory elements in order to sense a magnetic orientation of at least one of the plurality of magnetic memory elements and is utilized to thermally assist in switching a magnetic orientation of at least one of the plurality of magnetic memory elements; and the first and second vias are included in the sense line. Tellingly (in the Examiner's view) no relationship is claimed between either of the vias and the plurality of magnetic memory elements, or any single one of said plurality.

Art Unit: 2826

Applicant admits (see page 6 paragraphs 2 and 3) that the Daughton et al. reference discloses a magnetic random access memory device comprising a plurality of magnetic memory elements; a sense line coupled to the plurality of magnetic memory elements; and at least one via, included in the sense line. Applicant does not dispute that Daughton et al.'s sense line is at least reasonably capable of performing the functions of sensing a magnetic orientation of at least one of the plurality of magnetic memory elements and thermally assisting in switching a magnetic orientation of at least one of the plurality of magnetic memory elements.

Applicant further admits (see the middle paragraph of page 7) that its own individual via couples each single magnetic memory element of Daughton et al.'s plurality of magnetic memory elements to the sense line.

Applicant argues, however, that the reference does not disclose a second via included in the sense line.

In view of Applicant's admission that Daughton et al. discloses one via for each of a plurality of memory elements coupled the sense line, the Examiner is forced to disagree. In the reference, the disclosure of a one-to-one relationship between vias and memory elements necessarily means a plurality (two or more) vias, given the plurality of memory elements. Two or more vias necessarily include a first via and a second via. Note that there is nothing in the claims to distinguish the first via from the second via. In

Art Unit: 2826

light of this, it must be agreed that although phrased as "a first via and a second via," the claim simply requires two (fungible) vias.

Applicant discloses, see figure 6 and paragraph 0031 (as published) of the application, a structure where two vias 630 and 640, as well as a segment 620 of a sense line, are intimately associated with a single memory element (SDT, or SDT group, 610). The vias 630-640 and sense line segment 620, together with current source 660, form a loop in which current circulates, heating SDT 610. The Examiner, however, can see nothing in the claims that limits them to this embodiment. In the Examiners' view, the claims as written also easily read on an arrangement (such as the one found in Daughton et al.) where current flows from the sense line to ground through a first via, heating a first SDT associated with said first via, while more current flows from the sense line to ground through a second via, heating a second SDT associated with said second via. The fact that the two vias are indistinguishable from each other in the claims means there is no prohibition on the reference distinguishing them in any way it chooses.

It is argued, at page 8 of the remarks, that "Claims 2-10 and 13 depend from independent Claim 1 and inherit all of its limitations. Therefore, Claims 2-10 and 13 are also patentably distinct in view of the Examiner's reference and the rejections of Claims 2-10 and 13 under 35 U.S.C. §102(e) ought to now be withdrawn." Applicant is

Art Unit: 2826

understood by this to mean that the patentability of claims 2-10 and 13 should stand or fall with that of claim 1.

Conclusion

5. THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas L. Dickey whose telephone number is 571-272-1913. The examiner can normally be reached on Monday-Thursday 8-6.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sue Purvis can be reached on 571-272-1236. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2826

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'T. Dickey', is positioned above the printed name.

Thomas L. Dickey
Patent Examiner
Art Unit 2826
06/06